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ICI POLYURETHANES

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COLORADO DEPT OF HEALTH

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AN ACTIVE INVESTIGATION OF WORK-RELATED ASTHMA AND HYPERSENSITIVITY PNEUMONITIS WITH ATTACHMENTS AND COVER LETTER DATED 030493

Chemical Category
ISOCYANIC ACID, POLYMETHYLENEPOLYPHENYLENE ESTER (9016-87-9)

8d

Contains NO CBI

Polyurethanes

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24 pp

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March 4, 1993

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ATTN: TSCA Section 8(d) Health and Safety Reporting Rule
(Notification/Reporting)

Dear Sir/Madam:

In accordance with 40 CFR 716.30 ICI Polyurethanes Group, a business unit of ICI Americas Inc., hereby provides the following information and enclosed report to satisfy the reporting requirements under Section 8(d) of the Toxic Substances Control Act:

Chemical Substance: Isocyanic acid, polyme enepolyphenylene ester
[contains 50% Benzene,1,1'-methylenebis(4-isocyanato-]

CAS No.: 9016-87-9
[contains 50% CAS No. 101-68-8]

Study Description: An Active Investigation of Work-Related Asthma and Hypersensitivity Pneumonitis

Louisiana Pacific Corporation
P.O. Box 1269
Montrose, CO 81402

Name and Address of
Originating Organization:

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Sincerely,

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An Active Investigation of Work-Related Asthma and Hypersensitivity Pneumonitis

Louisiana-Pacific Corporation
P.O. Box 1269
Montrose, CO 81402

INTRODUCTION

The Colorado Department of Health (CDH) investigates work-related injuries and illnesses under the authority of Board of Health regulations that designate environmental and chronic diseases reportable by physicians and other health care providers. The goal of the case investigation is to prevent work-related injuries and illnesses in the future by study of the work environment.

In response to a number of physician-reported work-related asthma cases, CDH conducted an active investigation at a waferboard manufacturing facility in Montrose County. This report summarizes the history of CDH's involvement in this investigation, the respiratory disease cases diagnosed among Louisiana-Pacific Montrose employees, and the results of pulmonary function testing conducted by CDH. A glossary with definitions of the epidemiologic terms used in the report is also included.

Background:

In 1986, CDH requested the assistance of the National Institute for Occupational Safety and Health (NIOSH) to evaluate respiratory problems among employees of the Louisiana-Pacific Montrose plant. CDH had been contacted by local physicians who had treated several Louisiana-Pacific employees exhibiting respiratory symptoms consistent with asthma. CDH requested NIOSH assistance at the time of these initial physician contacts because the Department lacked resources to conduct workplace investigations.

Through a medical record review and employee interviews, examinations, and pulmonary function testing, NIOSH diagnosed thirteen cases of respiratory disease

(twelve cases of asthma, and one case of hypersensitivity pneumonitis) among Louisiana-Pacific employees at the Montrose plant. Medical history and diagnostic findings suggested that the cases were related to isocyanate exposure. NIOSH investigators concluded that "most of these cases probably resulted from exposure levels that existed after the introduction of the diisocyanate resin into the facility in June 1986, but before effective engineering controls and personal protection programs were in place" [1]. However, NIOSH identified three cases occurring after the controls were implemented.

In 1988, Colorado Board of Health added work-related asthma and hypersensitivity pneumonitis (HP) to its list of reportable diseases. In addition, the Board authorized access by CDH to the workplace and CDH to obtain pertinent records to investigate reportable work-related injuries and illnesses. Fourteen persons with physician-diagnosed asthma or HP related to work in the Montrose Louisiana-Pacific plant were reported to CDH between March 1988 and December 1991. A comparison of records indicated that only one of the 14 cases of asthma/HP reported to CDH (hereafter referred to as "CDH cases") was among the 13 cases of asthma/HP diagnosed by NIOSH (hereafter referred to as "NIOSH cases"). Thus, the total number of CDH and NIOSH cases is 26.

The 14 CDH cases were either reported by the diagnosing physicians, identified by CDH through a review of Workers' Compensation data, or reported by the employee to CDH through questionnaires and interviews. Two of the CDH cases were also diagnosed as having work-related hypersensitivity pneumonitis (HP). An epidemic curve showing the available dates of symptom onset of the CDH and NIOSH cases is presented in Figure 1 (there are 24 cases represented in Figure 1 because dates of onset were not available for two cases). Demographics, latency, and smoking histories of the CDH cases are presented in Table 1.

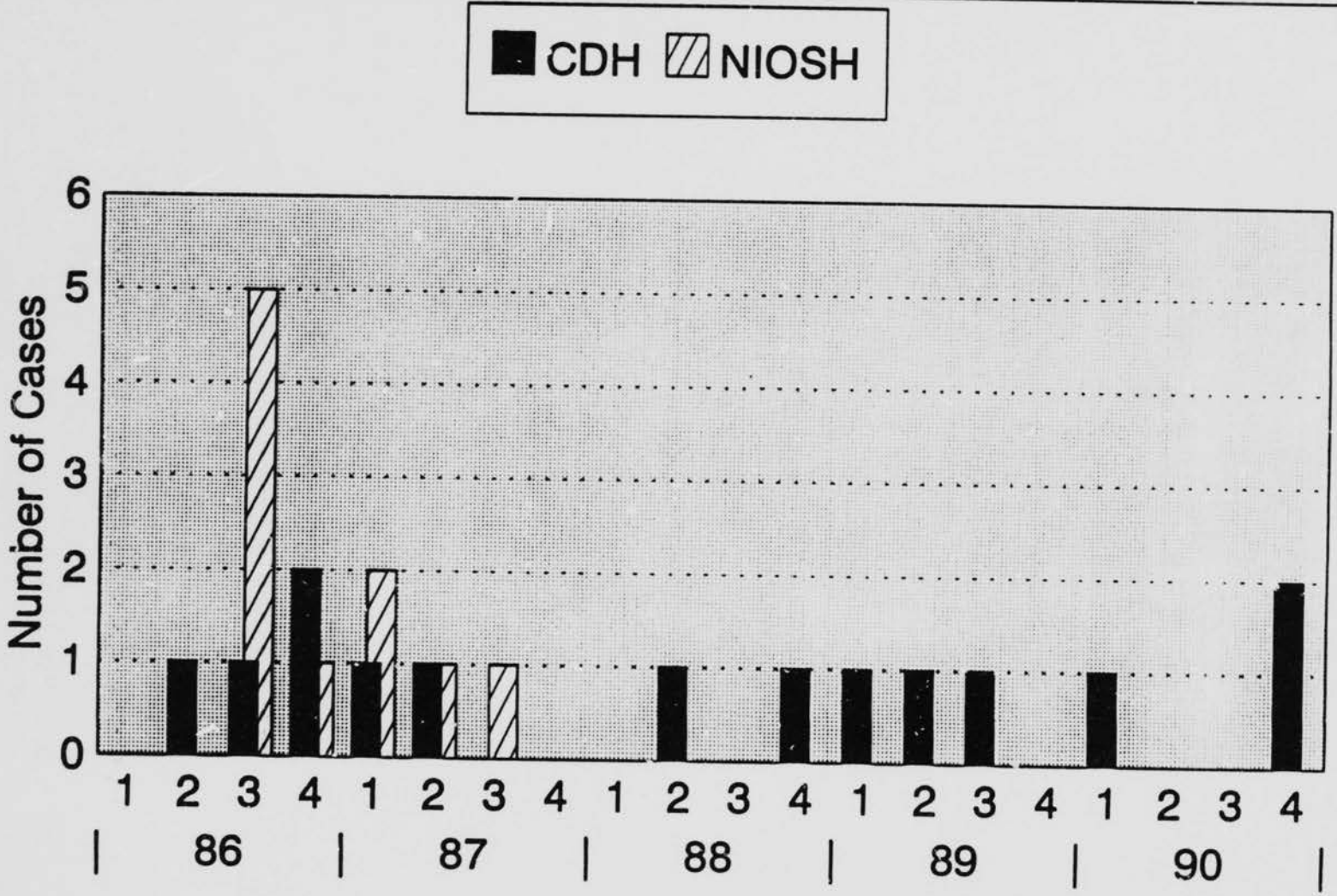
Dates of symptom onset for the fourteen CDH cases ranged from 1986 to 1991. Nine of the CDH cases developed symptoms after the NIOSH investigation and six began employment at LP after the NIOSH investigation. One of the CDH cases was reported subsequent to the questionnaires and pulmonary function testing (hereafter termed "active CDH investigation" described below.

The dates of onset of the cases reported to CDH after the NIOSH investigation indicated that there might be an ongoing exposure at the facility resulting in respiratory disease among current employees. CDH initiated an active workplace investigation at the Louisiana-Pacific Montrose facility to determine if current employees had respiratory changes related to current exposures at the plant.

Figure 1 - Onset of Symptoms of Asthma Cases

Diagnosed by NIOSH or Reported to CDH

Louisiana-Pacific Corporation, Montrose CO



By Quarter and Year

The sequence of events leading to the CDH active investigation is presented below:

December 1986	CDH requested NIOSH assistance in investigating respiratory
March 1987	NIOSH investigation at Louisiana-Pacific in which 13 cases of asthma/HP were diagnosed
Mar & July 1988	Two physician diagnoses of asthma/HP related to work at Montrose Louisiana-Pacific were voluntarily reported to CDH
August 1988	Colorado Board of Health regulations requiring physician reporting of work-related asthma and HP to CDH
December 1988	NIOSH Health Hazard Evaluation investigation report released
Aug. thru Nov. 1990	Ten diagnoses of asthma related to work at Montrose Louisiana-Pacific were reported to CDH
May and Dec. 1991	2 additional diagnoses of asthma related to work at Montrose Louisiana-Pacific were reported to CDH
January 1991	CDH distributed questionnaires to current employees, beginning the active investigation of asthma/HP among workers at Montrose Louisiana-Pacific
October 1991	CDH conducted pulmonary function testing at Montrose Louisiana-Pacific

Manufacturing Process:

Louisiana-Pacific began operation of a waferboard manufacturing facility near Montrose, Colorado in September, 1984. Aspen and pine trees are first sliced into wafer flakes. The flakes are conveyed to a bin where they are metered out for drying and screening. After drying, the flakes are conveyed to blenders where they are mixed with heat- and pressure-cured resin/wax binding materials. The coated wafers are conveyed to "formers" where they are distributed into a mat formation. The mats then go to a press that uses elevated temperature and pressure to activate the resins to bind the wafers into waferboard panels. The panels proceed through final trimming and cutting, grading, and banding for shipment.

The process has changed since the opening of the plant. Waferboard was initially manufactured using a phenol/formaldehyde resin to bind the wafers. In June 1986, the company began using a wax/diisocyanate combination as a binder. In 1988, the phenol/formaldehyde resin was added back to the system, so that the company is now using both types of binders concurrently to produce waferboard panels.

The isocyanate resin used for this process is listed on the Material Safety Data Sheet (MSDS) as a 50/50 mixture of 4,4-methylenediphenyl isocyanate (MDI) and similar structure oligomers (polymer molecules consisting of dimers, trimers, and tetramers of the monomeric units). The isocyanate and phenol/formaldehyde resin delivery systems from the outdoor storage tanks to the blenders are closed systems. The conveyers from the blenders to the formers and presses are enclosed and maintained under negative pressure to control emissions. At one time, a release agent was used to prevent binding of the waferboard panel to process components. Use of a release agent was discontinued in 1988.

Workforce:
The Montrose facility is operated by four twelve-hour rotating crews and employed 96 workers at the time of this investigation. Each employee on a rotating crew works as follows: four days on; four days off; four nights on; four nights off. Each rotating crew is made up of approximately 15 workers, with the permanent day crew consisting of an additional 20 employees. The remainder of the employees are salaried management. Because of the configuration of the facility and processes, all employees working inside the facility are potentially exposed to process chemicals and related airborne contaminants.

METHODS

Industrial Hygiene:
An initial workplace site visit and walkthrough inspection was conducted by CDH on January 30-31, 1991. During this visit, the company's hazard communication program and other health and safety records were reviewed. In addition, environmental sampling results collected separately by NIOSH, the Occupational Safety and Health Administration (OSHA), and Louisiana-Pacific's supplier of MDI (ICI Americas, Inc.) were reviewed.

Questionnaire Distribution:
CDH distributed a questionnaire (Attachment 1) to employees during the initial site visit. The questionnaire was designed to elicit information about respiratory symptoms, work practices, and training procedures. CDH returned to the workplace the following week to distribute the questionnaire to employees not present during the initial site visit.

CDH administered a second questionnaire to employees selected for pulmonary function testing during the October 24-30, 1991 site visit. This questionnaire was

designed to elicit information about respiratory symptoms, employment history, smoking history, and use of medications.

Pulmonary Function Testing Methods.
CDH offered pulmonary function tests (PFTs) to three groups of employees: employees with two or more asthma or HP symptoms (designated as "symptomatic"); employees with no symptoms (designated as "asymptomatic"); and employees who began employment after the initial questionnaire was distributed (designated as "new"). Asymptomatic employees still working at the plant in October 1991 were offered pulmonary function testing if their start dates of employment was within three months of a symptomatic employee's start date. For the four-day work crews, pre-, mid-, and post-shift PFTs were administered at the beginning and end of the four-day work period. For the permanent day crew, pre-, mid-, and post-shift PFTs were administered at the beginning and end of the five-day work period.

Pulmonary function testing was performed using Ohio Medical Model 822 dry rolling sealed spirometers attached to Spirotech 220B dedicated computers. Forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) were measured for each participant. The spirometers were calibrated at the beginning and end of each day of testing. For each testing session, a minimum of three valid breathing tests (each within 5% of the best effort) was obtained.

CDH solicited employee participation in the tests through personal letters sent approximately two weeks before the testing date and through verbal requests on the initial day of testing. All employees working on the days of the tests accepted the offer to participate in the testing.

Individual results from the pulmonary function testing were mailed to participants on December 16th, 1991. Summary results without personal identifiers were telefaxed to the plant manager on the same day.

EVALUATION CRITERIA

Industrial Hygiene:
Evaluation criteria used by the agencies that had collected exposure information at Louisiana-Pacific are listed in Table 2.

Exposures to MDI at this facility are of primary concern because the chemical is known to cause asthma and HP. The sampling data reviewed in this investigation relates primarily to monomeric MDI, as do the OSHA, ACGIH, and NIOSH standards. Unreacted isocyanate groups attached to polymeric isocyanate compounds may also cause effects similar to the monomer [5, 6].

Although both NIOSH and the company's MDI supplier (ICI Americas, Inc.) attempted to quantify exposures to oligomeric isocyanate, CDH is not confident that the data are reliable. A NIOSH memorandum dated July 18, 1991 [7] states that ..."Due to the fact that industry is moving toward formulations containing predominantly oligomers of isocyanates rather than monomer and due to the fact that processes involving monomeric isocyanates result in the formation of oligomers, it is necessary to evaluate the ability to obtain accurate analytical measurements for exposure to oligomeric isocyanates." NIOSH further comments that reliable analysis of field samples for oligomers has been difficult using their existing "validated" method. NIOSH recommends that the current NIOSH method be used only for quanitation of MDI monomers until the Institute completes development of a new method for quantitation of oligomeric isocyanate. NIOSH expects to complete the development of this method in mid to late 1992. The MDI supplier had also sampled for oligomeric isocyanate, but used an unvalidated method.

Pulmonary Function Tests:
The following four evaluation criteria were used in this study: FVC results predominantly (more than half of the measurements) below 80% of the predicted value [2]; FEV1 results predominantly below 80% of the predicted value [2]; FEV1/FVC ratio predominately below 70% [2]; a decline in FEV1 greater than 10% after the preshift test [3,4]. If an individual met one or more of the four evaluation criteria, the individual was considered to have abnormal tests and CDH recommended that the employee contact a physician for followup.

Statistical Analysis Criteria:
Univariate analyses of demographic variables, pulmonary function test results and symptom prevalences were performed using Fisher's exact, chi-square, or t-tests using the statistical package in EpiInfo. A p-value <0.05 was considered statistically significant.

RESULTS

Industrial Hygiene Records
Personal breathing zone measurements of exposures to wood dust and MDI did not exceed any of the three agencies' evaluation criteria (Table 2). On two separate occasions, the MDI supplier found MDI exposure concentrations close to their criteria limit for the dry end relief employee. During one of the sampling periods, the employee was wearing personal protective equipment (supplied-air respirator and Tyvek suit); his actual exposure was probably lower than the measured concentration.

Area air samples collected by NIOSH did not exceed their evaluation criteria for MDI. The isocyanate supplier, however, found five areas in 1987, and two areas in 1988 where MDI levels exceeded their evaluation criteria.

Questionnaire Results:
Eighty-four of 96 (88%) employees completed the first CDH questionnaire. Fifty-six (67%) employees reported no respiratory symptoms; 12 (14%) reported one symptom; and 16 (19%) reported two or more of the following symptoms: persistent cough, shortness of breath, chest tightness, wheeze, or frequent fever.

By October 1991, 8 of the 16 (50%) employees with two or more symptoms and 21 of the 56 (38%) asymptomatic employees were no longer employed at the Louisiana-Pacific Montrose plant.

Results of Pulmonary Function Testing:
From October 24 - 30, 1991, 27 employees (7 "symptomatic", 12 "asymptomatic", 7 new employees, and 1 other employee) participated in pulmonary function testing offered by CDH. In Table 3, the proportions of persons tested by each job category are presented. Demographics, length of employment, and smoking history of employees undergoing pulmonary function testing were compared to employees who did not test (Table 4). There were no statistically significant differences in the age, sex, race length of employment, or smoking history of those tested and not tested.

Eleven of 27 (41%) employees tested by CDH had abnormal PFT results. The type of abnormalities observed are shown in Table 5. Seven of these 11 employees (26% of 27 tested) demonstrated greater than 10% decrement in FEV1 during the shift.

Seven of 11 (64%) employees with abnormal PFTs and 4 of 16 (25%) employees with normal PFTs expressed two or more symptoms at time of the tests. Having symptoms was associated with abnormal PFTs (Odds Ratio = 5.25, 95% Confidence Interval = 0.76 - 41.27), but the odds ratio was not statistically significantly elevated. Twelve of 16 (75%) persons having no symptoms had normal PFTs.

As shown in Table 6, those with abnormal PFTs had a longer duration of employment than those with normal PFTs, although the difference was not statistically significant ($p=0.086$). A greater percentage of those with abnormal PFTs were current smokers compared to those with normal PFTs (Odds Ratio = 2.64, 95% Confidence Interval = 0.42 - 17.91), but again the difference was not statistically significant.

Prevalence rates of persons with abnormal PFTs by location of job duties for tested employees is presented in Table 7. Employees working inside the facility had greater than a four-fold risk of having an abnormal PFT (Odds Ratio = 4.55, 95% Confidence Interval = 0.37 - 122.14), although the odds ratio was not statistically significantly elevated.

DISCUSSION

Although exposures to asthma-causing agents in excess of standards for OSHA, NIOSH, and other recognized professional organizations have not been documented at this plant, there is epidemiologic and clinical evidence of continuing adverse health effects related to the workplace. In the past six years, twenty-six workers at the facility have been diagnosed as having work-related asthma; two of the workers were also diagnosed with work-related HP. Thirty percent of the workforce had pulmonary function tests performed by CDH. The tested persons included both symptomatic and asymptomatic employees. The tested group did not differ from other workers in terms of demographic characteristics and length of employment.

Forty-one percent of current employees had abnormal PFT results consistent with asthma, and 26% of those tested demonstrated a greater than 10% drop in FEV1 during the workday. These results indicate that workers may be experiencing acute obstructive respiratory reactions to exposures in the workplace [3,4]. However, the prevalence rate for tested workers (41%) may be higher than would be expected for the entire exposed workforce at this facility because some of the workers tested by CDH were selected based upon reported respiratory symptoms.

The finding that employees had significant decreases in FEV1 over the course of the workday indicates that changes in pulmonary function are related to employment inside the plant. Several symptomatic employees referred to "blow-down" (a process conducted during the night shift that consists of using positive air pressure to blow accumulated dust from parts of the production line) when asked about particular operations that exacerbate symptoms. Several employees similarly related an increase in symptoms when working in the "dry end".

Although differences between persons with normal and abnormal PFTs were noted in smoking histories, duration of employment, and presence of symptoms, the differences were not statistically significant. This is likely due to the small sample size which resulted in low statistical power.

RECOMMENDATIONS

1. The employer should develop a systematic plan for sampling of MDI exposure concentrations. Particular attention should be paid to monitoring exposure during production upsets, "blowdown", and work in the "dry end" to determine if certain operations lead to exposure.

2. Employees should be informed of the results of exposure monitoring.

3. Sampling should be conducted to characterize exposure to MDI oligomers when NIOSH completes the development and validation of a sampling and analytical method.

4. The effectiveness of new and existing ventilation systems should be evaluated. This should include initial and continued periodic measurements of airflow to ensure that the systems are working properly.

5. The employer's program for medical screening of workers potentially exposed to isocyanates should be improved to include the following:

> New employees are currently receiving pre-employment pulmonary function tests, but are not being asked for a medical history to seek previously existing respiratory symptoms and disease, or an occupational history to seek evidence of previous exposure to isocyanates. The employer should add these components to their program for new employees.
>
> All employees are currently receiving annual pulmonary function tests which are not used as a basis for further medical follow-up. The employer should improve the tracking and evaluation of the results of annual testing, and refer employees with decrements in lung function to a qualified occupational physician for further evaluation.

6. The employer should ensure that the consultant delivering pulmonary function testing is using trained, certified technicians, and a spirometer and test procedures that meet American Thoracic Society specifications.

7. The employer should ensure that all employees receive copies of their pulmonary function test results.

8. Employees diagnosed with work-related asthma should be removed from exposure to emissions from the production process and informed about their Workers' Compensation eligibility.

9. The employer should continue to encourage employees to report respiratory symptoms through the appropriate channel and ensure that symptomatic employees suffer no discrimination.

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State Epidemiologist

Jane B. McCammon, MS, CIH
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GLOSSARY

Confidence interval - The confidence interval is one way of expressing the strength of a statistical association. A 95% confidence interval that includes 1.0 is not statistically significant, i.e. the p-value (probability value) is greater than 0.05. If the lower boundary of the 95% confidence interval is greater than 1.0, or conversely the p-value is less than 0.05, the observer is 95% sure that the odds ratio is somewhere between the upper and lower limits of the interval.

Odds Ratio - a measure of the strength of association of two observances (i.e., the association of pulmonary function tests and respiratory symptoms).

Sample size - In this study, sample size is the number of people tested. Statistical significance is greatly influenced by the sample size. The smaller the sample size, the stronger the association must be (i.e., larger the odds ratio must be) to achieve statistical significance.

Statistical significance - a measure of the probability that a statistical observance is not due to random chance.

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5. Hardy HL, Devine JM [1979]. Use of organic isocyanates in industry - some industrial hygiene aspects. Annals of Occupational Hygiene. Vol. 22: pp.421-427.

6. Weyel DA, Rodney BS [1982]. Sensory irritation, pulmonary irritation, and acute lethality of a polymeric isocyanate and sensory irritation of 2,6 - toluene diisocyanate. Toxicology and Applied Pharmacology, Vol.64: pp 423-430.

7. National Institute for Occupational Safety and Health NIOSH [1991]. Internal memo.

Table 1
Demographics, Latency, and Smoking Histories and Job Titles of
Montrose Louisiana Pacific Employees
with Work-Related Asthma/HP Diagnoses Reported to CDH

Number of Diagnoses Reported = 14

Age at Time of Report	
Range (years)	21-55
Mean (years)	36
Sex (% male)	100
Race (% Anglo)	69
(% Hispanic)	31
Latency (months)	
Range	<1-47
Mean	13
Smoking History	
% Ever smoked	Not available
% Currently smoking	36

Job Titles of Reported Cases (number of cases)

Blender Operator	1
Electrician	1
Knife Grinder	1
Line Technician	2
Maintenance	3
Millwright	2
Tongue/Groove Helper	1
Utility Worker	1
Utility/Equip. Maintenance	1
Waferizer Operator	1

Table 2

Most Restrictive Evaluation Criteria Used by Agencies that had Monitored Occupational Exposures at Louisiana-Pacific Montrose

	Agencies that had Monitored Exposures		
Analyte	OSHA	NIOSH	ICI Americas, Inc.*
MDI	0.20 mg/m3** 8-hr TWA***	0.05 mg/m3 8-hr TWA	0.055 mg/m3 8-hr TWA
			0.037 mg/m3 12-hr TWA
		0.2 mg/m3 Ceiling****	
Wood Dust	None sampled	1 mg/m3 8-hr TWA	5 mg/m3 8-hr TWA

*ICI Americas, Inc. is Louisiana-Pacific's MDI supplier

**mg/m3 = Milligrams of analyte per cubic meter of air

***TWA = Time weighted average concentration

****Ceiling = Maximum allowable concentration in any 10-minute sampling period

Table 3
Comparison of the Job Categories of Louisiana-Pacific Montrose Employees
Total Facility Population vs. Employees Who Had PFTs*

Job Category	Number Tested	% of all Tested (N = 27)	% of this job category tested	Number in this Job (N = 96)	% of the Total Workfo e in this job*
Board Grader	2	7.4	50	4	4
Chop Saw Operator	1	3.7	25	4	4
Dryer Operator	1	3.7	25	4	4
EFB (Dryer)	1	3.7	25	4	4
Electrician	1	3.7	20	5	5
Green End/Log Deck	2	7.4	50	4	4
Knife Grinder	1	3.7	50	2	2
Line Technician	3	11.1	75	4	4
Mob. Equip. Mechanic	1	3.7	50	2	2
Millwright	3	11.1	60	5	5
Mobile Equipment Operator	2	7.4	29	7	7
Press Operator	3	11.1	75	4	4
Tongue and Groove (inc. Helpers)	3	11.1	37.5	8	8
Trucker/Strapper	1	3.7	25	4	4
Waferizer Operator	2	7.4	50	4	4
JOB TITLES NOT TESTED					
Production Maintenance				4	4
Utility				2	2
Supervisors				9	9
Clerical				3	3
Foremen				2	2
Forester				1	1
Quality Control Director				1	1
Plant Manager				1	1
Warehouse Trucker				2	2
Janitor				1	1
950/966 Operator				2	2
Storeroom				1	1
Oiler				1	1
Lab Technician				1	1

* Job titles of tested employees at the time of testing.
** Does not total to 100% due to rounding.

Table 4

Comparison of Demographics, Length of Employment, and Smoking History of Louisiana-Pacific Montrose Employees whose Pulmonary Function Was and Was Not Tested by CDH*

	PFT Tested by CDH N=27	PFT Not Tested by CDH N=64
Age (years)		
Range	21-48	18-56
Mean	33	32
Median	33	31
Sex (male)	23 (85%)	58 (91%)
(female)	4 (15%)	6 (9%)
Race (Anglo)	21 (78%)	55 (86%)
(Hispanic)	5 (19%)	8 (12%)
Length of employment (months)		
Range	2-77	1-78
Mean	28	36
Median	26	34
Smoking History		
Ever smoked	18 (69%)	43 (68%)
Currently smoking	10 (38%)	19 (31%)

*This was obtained through the CDH questionnaires distributed in January 1991 and through interviews of the 7 new employees whose pulmonary function was tested in October 1991.

Table 5

Distribution and Types of Abnormalities in Pulmonary Function
among Louisiana-Pacific Employees Tested by CDH

Mutually Exclusive Categories of Abnormalities	Number (Percentage) of Employees Total Number Tested = 27
Abnormal FEV1 and FVC	1 (4)
Abnormal FEV1/FVC ratio	1 (4)
Abnormal FEV1 and FEV1/FVC ratio	2 (7)
Abnormal FEV1, FEV1/FVC ratio, and greater than 10% drop in FEV1	1 (4)
Greater than 10% drop in FEV1 and abnormal FEV1/FVC ratio	1 (4)
Greater than 10% drop in FEV1	5 (18)
TOTAL WITH ABNORMAL RESULTS	11 (41)

Table 6
Demographics, Length of Employment, and Smoking History of LP Montrose Employees whose Pulmonary Function was Tested by CDH
October 24-30, 1991

	Normal PFTs N = 16	Abnormal PFTs N = 11
Age (years)		
Range	21-49	27-48
Mean	34	35
Median	30	35
Sex (male)	14 (88%)	9 (82%)
(female)	2 (12%)	2 (18%)
Race (Anglo)	14 (88%)	8 (73%)
(Hispanic)	2 (12%)	3 (27%)
Length of employment (months)		
Range	2-70	4-96
Mean	30	47
Median	34	42
Smoking History		
Ever smoked	13 (81%)	7 (64%)
Currently smoking	5 (31%)	6 (54%)

Table 7

Prevalence Rates by Job Location for Louisiana-Pacific Montrose Employees Whose Pulmonary Function was Tested by CDH

Job Location	Number Tested	Number with abnormal PFT	Prevalence Rate
Job duties almost exclusively outside the plant (Chop Saw, Green End/Log Deck, Mobile Equipment Operator, Trucker/Strapper)	6	1	17%
Some or all job duties inside (Board Grader, Dryer Operator, EFB, Electrician, Knife Grinder, Line Technician, Mobile Equip. Mechanic, Millwright, Press Operator, Tongue and Groove, Waferizer)	21	10	48%

Attachment 1

CDH Questionnaire used at the Montrose Louisiana-Pacific Facility

Colorado Department of Health
Current Employee Questionnaire

Louisiana Pacific Corporation
Montrose, Colorado

Questionnaire Number _____ Date _____

Name: _____ _____
Last name First name

Address: _____

_____

Telephone Number: (___)_____

Date of Birth: _____ ___ _____ **Age:** _____ years
Month Day Year

Race (check one): ___1. White 3. Hispanic **Sex:** ___1. male
___2. Black 4. Other ___2. female

MEDICAL INFORMATION

Within the last six months have you experienced any of these symptoms?

1. Shortness of breath or difficulty breathing? ___no ___yes
2. Chest pain or chest tightness? ___no ___yes
3. Wheezing? ___no ___yes
4. Persistent cough? ___no ___yes
5. Fever on more than two occasions? ___no ___yes

If you answered yes to any of the above, do you think your symptoms are associated with what you do at work? ___no ___yes

Have you ever been diagnosed by a physician as having asthma?
___no ___yes ___don't know

If you were diagnosed with asthma, in what month and year did you receive this diagnosis?
Month_____ Year_____

If you were diagnosed with asthma, how old were you at the time of diagnosis?
_____years old

If you were diagnosed with asthma, did your physician think your asthma was related to your work at Louisiana Pacific? ___no ___yes

SMOKING HISTORY CDH

Have you ever smoked cigarettes? ___no ___yes

Do you smoke cigarettes now? ___no ___yes

What is the total number of years you have smoked cigarettes? _____years

On average, how many cigarettes per day have you smoked?
____packs per day or ____cigarettes per day

JOB HISTORY

When did you begin work at the Montrose Louisiana Pacific plant?

_____ ____ _____
Month Day Year

In what department or area of the plant do you work? _____

What is your present job title? _____

How many months have you worked in your present job title? _____months

What hours do you currently work? _____ (___am ___pm) to _____ (___am ___pm)

Is this your regular work schedule? ___no ___yes

If no: what is your regular work schedule? _____ _____

PROTECTIVE CLOTHING

Do you work in a job in which you sometimes get waferboard products or chemicals on your skin?
___no ___yes

Have you been provided with gloves or protective clothing to protect against this skin exposure?
___no ___yes

RESPIRATORS

Do you wear a respirator or face mask in your job? ___no ___yes

If you wear a respirator, were you given medical tests to make sure you are physically able to use a respirator? ___no ___yes

If you wear a respirator, have you been trained in how to use it? ___no ___yes

If you wear a respirator, were you fit-tested to make sure that the respirator adequately seals to your face? ___no ___yes

Do you have a beard? ___no ___yes

EXPOSURE MONITORING

Has someone from Louisiana Pacific (or their representative) ever put a pump or badge on you to measure your exposure to chemicals or dust? ___no ___yes

If yes: were you informed of the results of the test(s)? ___no ___yes

If you were informed of the results: were you told that you were overexposed to dust, MDI (isocyanates), or formaldehyde? ___no ___yes

HAZARD COMMUNICATION

Have you received training about the chemicals with which you work and the health effects that can result from overexposure to those chemicals? ___no ___yes

Are Material Safety Data Sheets readily available to you at your worksite?
___no ___yes ___don't know **what** they are ___don't know **where** they are

MEDICAL MONITORING

Were you required to have a preemployment physical before beginning work at the Montrose Louisiana Pacific plant? ___no ___yes

If yes: did this physical include a breathing test? ___ no ___yes
did the physician take a medical and employment history?
___no ___yes

Has Louisiana Pacific required or provided you with medical tests since you started work at the Montrose plant? ___no ___yes

If yes: how often are medical tests provided or required?
___every six months ___once a year ___every two years ___other

do the tests include:
a breathing test? ___no ___yes
a chest x-ray? ___no ___yes
a hearing test? ___no ___yes
an exercise test or a treadmill test? ___no ___yes
other tests? (Please list other tests)

_____
_____
_____

CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY that the microimages appearing on this microfiche are accurate and complete reproductions of the records of U.S. Environmental Protection Agency documents as delivered in the regular course of business for microfilming.

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